Exhibit A

<u>Rim material</u>: Glass Fiber / Epoxy matrix

1. Modulus of elasticity E_r in the hoop direction is calculated by Equation 5.3, shown in Attachment 1, which gives the E_r value of the composite based on the volume fraction of fiber and matrix.

$$E_r = E_c = V_f E_f + E_m (1 - V_f) \qquad (5.3)$$

The volume fraction of fiber is know by the flywheel manufacturer using convention measurement techniques. In this example, the fiber volume fraction

$V_f = 0.65$
$E_m = 413$ ksi (from Attachment 2)
$= 2.85$ GPa
$E_f = 72.45$ GPa (from Attachment 3, page 2)
$E_r = 0.65 \times 72.45 + 2.85 \times (1-0.65)$
$= 48.09$ GPa

<u>Rim liner material</u>: Nylon 66

2. $E_l = 3.5$ GPa (from Attachment 4)

3. To obtain the ratio R_r of hoop modulus to density E_r/ρ_r, the density ρ_r is calculated from Equation (5.6) in Attachment 1 as follows:

$\rho_r = \rho_c = V_f \rho_f + V_m \rho_m$
$= V_f \rho_f + (1-V_f)\, \rho_m$
$\rho_f = 2.59\ g/cm^3 = 2.59 \times 10^3\ Kg/m^3$ (from Attachment 3)
$V_f = 0.65$
$\rho_m = 1.161\ g/cm^3 = 1.161 \times 10^3\ Kg/m^3$ (from attachment 2)
$\rho_r = 0.65 \times 2.59 \times 10^3 + (1-0.65) \times 1.161 \times 10^3$
$= 2.09 \times 10^3\ Kg/m^3$

$R_r = E_r/\rho_r,$
$R_r = 48.09/(2.09 \times 10^3$
$= 0.23\ GPa\ m^3/Kg$

4. To obtain the ratio R_l of hoop modulus to density E_l/ρ_l, the density of the liner material can be obtained from open literature. In this case, the density of Nylon 66 is

$\rho_l = 1.14 \times 10^3\ Kg/m^3$ (from Attachment 4)
$R_l = E_l/\rho_l$
$= 3.5/(1.14 \times 10^3)$
$= 0.0031\ GPa\ m^3/Kg$

Therefore, $R_r > R_l$